SPECIFICATION AMENDMENTS

[0019] A cable's electrical characteristics are interdependently determined, in part, by component dimensions and variances thereof. Accordingly, to maximize performance for high-speed, high-bandwidth applications, and to produce coaxial cables having characteristic impedances with a very low tolerance of ± 1 ohm: (i) the components in the coaxial cable of the present invention are provided according to very close manufacturing tolerances; and (ii) it has been found that the following component dimensions provide a very-fast (propagation speed of 1.14 ns/ft nominal ± 0.01 ns/ft for a 50 ohm cable, bandwidth up to 20 GHz), very-small 50 ohm coaxial cable suitable for high bandwidth applications: central conductor = 32 AWG – 22 AWG; filament diameter = 0.0025" – 0.010" ([[± 0.0025"]] ± 0.00025" tolerance); insulator sheath ~~inner/outer~~ inner diameter = 0.020" to 0.075" (± 0.0005" tolerance); insulator sheath wall thickness = 0.005" (± 0.00025" tolerance).

[0044] Referring back to FIG. 4, and comparing it to the prior art shown in FIG. 1, it should be appreciated that using the dual filament wrap 16 of the present invention reduces the overall amount of material in the airspace 22, while still ensuring that the sheath 20 is offset the same distance from the conductor 18. For example, to offset the sheath 20 from the conductor 18 by a distance of L, a single insulator filament 24 may be used having a radial cross-sectional area of [[(πL2)/4]] $\underline{(\pi L^2)/4}$. However, if the two filaments 12, 14 are used, the total radial cross-sectional area is [[(πL2)/8]] $\underline{(\pi L^2)/8}$, or half.

[0063] The following table illustrates how the propagation delay (in units of picoseconds per foot) and impedance of a 50 ohm characteristic impedance coaxial cable, made according to the present invention (see the preferred component values for the "50 Ohm Coax" cable given in Table 2 below), vary according to part tolerances. The values given are averages of various test studies for the stated parameters, with non-stated parameters remaining constant.

TABLE 1: Summary of Mechanical Tolerances vs. Electrical Tolerances

Parameter	Change 1 (inches)	Impedance Change (ohms)	Propagation Delay Change (ps/ft)	Change 2 (inches)	Impedance Change (ohms)	Propagation Delay Change (ps/ft)
Core* OD	± 0.0005"	± 0.74	± 3.6	± 0.001"	[[± 1.19]] ± 1.49	± 7.7
Core ID	± 0.0005"			± 0.001"		
Core OD	± 0.0005"	± 0.46	± 2.5	± 0.001"	± 0.92	± 5.0
Core Wall**	± 0.00025"			± 0.0005"		
Core Wall	± 0.00025"	± 0.29	± 6.4	± 0.0005"	± 0.57	± 12.8
Core ID	± 0.0005"			± 0.001"		
Filament Diameter	± 0.00025"	± 0.19	± 4.2	± 0.0005"	± 0.38	± 8.5
Filament Wrap Lay	± 0.005"	± 0.035	± 0.90	± 0.010"	± 0.08	± 0.17
Filament Twist Lay	± 0.005"	± 0.01	± 0.20	± 0.010"	[[± 0.20]] ± 0.020	± 0.45
* "Core" refers to the insulator sheath 20; ** "Core Wall" refers to the thickness of the insulator sheath.						

By way of explanation, for example, the study examining variances in "Core OD" and "Core ID" (row 1) represents a scenario where the insulator sheath has the proper wall thickness, but is extruded either too tight or too loose, i.e., there are variances in the inner diameter ("ID") and/or outer diameter ("OD") of the insulator sheath 20 with respect to the central conductor, along the cable's length. As should be appreciated, with a diameter error of only ± 0.0005" the impedance error is about ± 0.75 ohms, while with a diameter error of ± 0.001" the impedance error is about [[± 1.2]] ± 1.5 ohms and the propagation speed error is around ± 7.7 ps/ft. It can also be noted

that the effect of some parameter variations are greater on the propagation speed values and others are greater on the impedance values, therefore these relative variations must be considered as a whole.

[0066] In light of the above, and as determined experimentally, to maximize performance for high-speed, high-bandwidth applications, and to provide a coaxial cable having a very low tolerance characteristic impedance (e.g., of ± 1 ohm for a 50 ohm cable), certain components in the coaxial cable of the present invention are provided according to very close manufacturing tolerances, as follows: insulator sheath [[OD/ID]] OD and ID tolerance = ± 0.0005"; insulator sheath wall thickness tolerance = ± 0.00025"; and filament diameter tolerance = ± 0.00025". The following table shows preferred component values for three cables having standard characteristic impedances (50 ohms, 75 ohms, and 100 ohms), which have been found to result in an ultra-fast and ultra-small coaxial cable with enhanced electrical properties:

TABLE 2: Cable Electrical and Mechanical Properties

Property	50 Ohm Coax	75 Ohm Coax	100 Ohm Twinax
Impedance	50 ohms	75 ohms	100 ohms
Tolerance	± 1 ohm	± 3 ohms	± 5 ohms
Propagation Speed	1.14 ns/ft nominal	1.14 ns/ft nominal	1.14 ns/ft nominal
Tolerance	± 0.01 ns/ft	± 0.01 ns/ft	± 0.01 ns/ft
Capacitance	22.5 pF/ft nom	15.0 pF/ft nom	11.4 pF/ft nom
Bandwidth	Up to 20 GHz	Up to 20 GHz	Up to 20 GHz
Central Conductor range	32 AWG to 22 AWG	34 AWG to 16 AWG	32 AWG to 22 AWG
Filament Size range	0.0025" to 0.010"	0.003" to 0.025"	0.0025" to 0.010"
Filament Tolerance	± 0.00025"	± 0.0025"	± 0.0025"
~~Filament Wrap Pitch~~ Filament Twist Pitch	11 x Filament Diameter	11 x Filament Diameter	11 x Filament Diameter
Filament Wrap Pitch	20 x Filament Diameter	20 x Filament Diameter	20 x Filament Diameter
Insulator Sheath Size Range (ID & OD)	0.020" to 0.075"	0.030" to 0.200"	0.020" to 0.075"
Insulator Sheath Tolerance (ID & OD)	± 0.0005"	± 0.0005"	± 0.0005"
Insulator Sheath Wall Thickness*	0.005"	0.005"	0.005"
Insulator Sheath Wall Thickness Tolerance	± 0.00025"	± 0.00025"	± 0.00025"

* Insulator sheath thickness can vary from application to application; 0.005" is an example value of one commonly-used, suitable thickness.